

**Claims**

1. A method for the continuous polymerization of vinyl monomers to vinyl polymers,  
characterized in that  
5 the polymerization takes place in a planetary roller extruder.
2. The method for continuous polymerization of vinyl monomers to vinyl polymers of  
claim 1,  
characterized in that  
10 the vinyl polymers have a molecular weight  $M_w$  of more than 400 000 g/mol and/or  
polydispersities ( $M_w/M_n$ ) of greater than 5.
3. The method of claim 1 or 2,  
characterized in that  
15 the polymerization takes place without addition of solvent.
4. The method of at least one of claims 1 to 3,  
characterized in that  
the polymerization  
20 a) takes place in a hydraulically filled planetary roller extruder,  
b) is carried out by thermally induced decomposition of free radical-forming initiators,  
c) takes place in the presence of 0 to 25% by weight, based on the vinyl monomers  
of a solvent, and/or  
d) is carried out in the presence of resin or plasticizers in fractions of 0 to 30% by  
25 weight, preferably in fractions of 0 to 10% by weight, more preferably in fractions  
of 0 to 5% by weight.
5. The method of at least one of the preceding claims,  
characterized in that  
30 the hydraulic filling of the planetary roller extruder with reaction mixture takes place by  
means of  
a) the material exit aperture of the planetary roller extruder being situated higher  
than the maximum fill level of the reaction mixture within the roller barrels,

b) central spindle and planetary spindles rotate counter to the material conveying direction normally induced by the helical gearing, the conveying of the reaction mixture within the planetary roller extruder then taking place by means of the preferred feed pump for the vinyl monomers.

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6. The method of at least one of the preceding claims, characterized in that the mixture of the vinyl monomers is preheated, prior to entering the planetary roller extruder, to temperatures of more than 50°C, preferably to temperatures above 70°C, and more preferably to temperatures of more than 85°C.

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7. The method of at least one of the preceding claims, characterized in that the initiators are cooled and are added to the vinyl monomers not until immediately before entry of the monomer stream into the planetary roller extruder.

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8. The method of at least one of the preceding claims, characterized in that further initiators are added at at least one further site downstream of the process section of the planetary roller extruder.

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9. The method of at least one of the preceding claims, characterized in that the initiators for initiating the reaction have half-lives of 10 hours at temperatures of less than 120°C and are selected from the group of the azo initiators, from the group of the organic peroxides, or from mixtures of initiators of the stated groups, preferably those having a crosslinking efficiency of less than 20%, in particular those having a crosslinking efficiency of less than 10%.

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10. The method of at least one of the preceding claims, characterized in that the initiators added downstream of the process section have half-lives of 10 hours at temperatures of more than 50°C and are selected from the group of the azo initiators,

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from the group of the organic peroxides, or from mixtures of initiators of the groups stated.

11. The method of at least one of the preceding claims,

5 characterized in that  
the vinyl monomers contain compounds and/or the reaction mixture which has  
already been initially polymerized is supplied with compounds which lower the  
molecular weight during the polymerization, said compounds being selected  
preferably from the group of the nitroxyl compounds, thiols, TEMPO derivatives,  
10 thioesters, thiocarbonates, alcohols, ethers, and halogenated hydrocarbons, and are  
present with particular preference in fractions of 0 to 5% by weight, preferably 0 to 3%  
by weight, more preferably 0 to 1% by weight, with respect to the vinyl monomers  
employed.

12. The method of at least one of the preceding claims,

characterized in that  
liquid resins, resin melts or plasticizers are added in fractions of 0 to 30% by weight,  
preferably of 0 up to 5% by weight, to the reaction mixture after the beginning of  
polymerization.

13. The method of at least one of the preceding claims,

characterized in that  
more than 30%, preferably more than 45%, of the vinyl monomers are reacted to vinyl  
polymers.

14. The method of at least one of the preceding claims,

characterized in that  
the vinyl polymers are freed from their volatile constituents, preferably inline.

15. The method of at least one of the preceding claims,

characterized in that  
the vinyl polymers are admixed, preferably inline, with further substances such as  
tackifying resins, fillers, crosslinkers and/or crosslinker assistants and, in this way,

vinyl polymer compounds are prepared which find use as pressure-sensitive self-adhesive compounds.

16. The method of at least one of the preceding claims,

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characterized in that

the vinyl polymers are used in a downstream process stage as vinyl prepolymers for producing pressure-sensitive self-adhesive compounds.

17. The method of at least one of the preceding claims,

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characterized in that

the vinyl polymers or the vinyl polymer compounds are applied inline to the production operation to carrier materials in web form.